**Lesson 11 – Metallic Bonding**

**Metals**

* Low ionization energies and low electronegativities.
* Cannot hold and attract electrons easily.

**Metallic Bonding**

* A type of bond that occurs between two atoms that have low ionization energies and low

Electronegativities: looking at metals

* In the solid and liquid states, the valence electrons can move freely from one atom to the

next: they are delocalized.

* Chemist use the electron-sea model to describe the

delocalized condition:

* + Cations in a sea of moving electrons.
  + Each cation is attracted to many electrons at once.

**Properties of Metallic compounds**

* Solids at room temperatures (except Mercury)
  + Due to presence of strong metal to metal bonding.
  + The degree of hardness of a metallic compound varies among the metals
* High melting point and boiling points
  + Must overcome the attractive force between the delocalized electrons and the nuclei.
* Good conductors of electricity and heat
  + Due to the mobility of the electrons, energy can be transmitted rapidly.
* Malleable and ductile
  + Metal atoms are not restricted by a fixed bond, and therefore can slide over each other.
  + The extent of malleability and ductility varies among the metals.

**Alloys**

* Mixture of two or more different types of metals
  + Possible since the electrons in the electron-sea are attracted to any positive metal ion.
* Substitutional alloy (atoms of similar size):
  + Atoms from one metal can take the place of atoms in the other metal.
* Interstitial alloy (atoms of one metal are smaller):
  + The smaller atom fill into spaces between large atoms.